S.Q. TUBE

Special quality output pentode

QUICK REFERENCE DATA			
Life test	10 000 hours		
Low interface resistance			
Mechanical quality	Shock and vibration resistant		
Base	Noval. Gold plated pins		
Heating	Indirect A.C. or D.C. Series or parallel supply		
Heater voltage	V_f	6.3	V
Heater current	I_f	700	mA
Anode current	I_a	30	mA
Output power, one tube	W_o	2.7	W
two tubes class AB	W_o	5.7	W

DIMENSIONS AND CONNECTIONS

Dimensions in mm

Base: Noval

CHARACTERISTICS

Column I Nominal value or setting of the tube
II Range values for equipment design: Initial spread
III Range values for equipment design: End of life

		I	II	III	
Heater voltage	V_f	6.3			V
Heater current	I_f	700	665 - 735		mA
Anode voltage	V_a	200			V
Grid No.3 voltage	V_{g_3}	0			V
Grid No.2 voltage	V_{g_2}	200			V
Cathode resistor	R_k	130			Ω
Anode current	I_a	30	26.5 - 33.5	min. 21	mA
Grid No.2 current	I_{g_2}	4.1	2.7 - 5.5	min. 2.0	mA
Mutual conductance	S	9.0	7.4 - 10.6	min. 6.0	mA/V
Amplification factor grid No.2 to grid No.1	$\mu_{g_2g_1}$	21.5			
Negative grid No.1 current	$-I_{g_1}$		max. 0.5	max. 1.0	µA
Anode voltage	V_a	200			V
Grid No.3 voltage	V_{g_3}	0			V
Grid No.2 voltage	V_{g_2}	200			V
Anode current	I_a	30			mA
Load resistance	$R_{a\sim}$	7			kΩ
Output power	W_o	2.7	min. 2.0		W
Cut-off voltage	$-V_{g_1}$	14			V
Anode voltage	V_a	200			V
Grid No.3 voltage	V_{g_3}	0			V
Grid No.2 voltage	V_{g_2}	200			V
Anode current	I_a		max. 0.2		mA

CHARACTERISTICS (continued)

		I	II	III	
Hum voltage	V_{g_1}		max.0.25		mV_{RMS}
Grid No.1 resistor R_{g_1} = 0.5 MΩ Cathode resistor by-passed					
Leakage current between cathode and heater	I_{kf}		max. 15	max. 20	μA
Voltage between cathode and heater V_{kf} = 120 V					
Insulation resistance between two electrodes	R		min. 50	min. 10	MΩ
Voltage between electrodes = 300 V					

CAPACITANCES

		I	II	
Grid No.1 to grid No.3, grid No.2, cathode heater and screen	C_{g_1/g_3g_2kfs}	10	9.2 - 10.8	pF
Anode to grid No.3, grid No.2, cathode heater and screen	C_{a/g_3g_2kfs}	6.8	6.3 - 7.3	pF
Anode to grid No.1	C_{ag_1}		max.0.15	pF
Grid No.1 to heater	C_{g_1f}		max.0.25	pF
Cathode to heater	C_{kf}	7.0		pF

SHOCK AND VIBRATION RESISTANCE

The following test conditions are applied to assess the mechanical quality of the tube. These conditions are not intended to be used as normal operating conditions.

Shock

The tube is subjected 5 times in each of 4 positions to an acceleration of 500 g supplied by an NRL shock machine with the hammer lifted over an angle of 30°.

Vibration

The tube is subjected during 32 hours in each of 3 positions to a vibration frequency of 50 Hz with an acceleration of 2.5 g.

LIFE

Production samples are tested to be within the end of life values (column III) under the following conditions during 10 000 hours.

Anode voltage	V_a	200	V
Grid No.3 voltage	V_{g_3}	0	V
Grid No.2 voltage	V_{g_2}	200	V
Cathode resistor	R_k	130	Ω

LIMITING VALUES (Absolute max. rating system)

Anode voltage	V_{a_o}	max.	600	V
	V_a	max.	300	V
Anode dissipation	W_a	max.	8	W
Negative grid No.3 voltage	$-V_{g_3}$	max.	100	V
Grid No.2 voltage	$V_{g_{2o}}$	max.	600	V
	V_{g_2}	max.	300	V
Grid No.2 dissipation	W_{g_2}	max.	2.6	W
Grid No.1 voltage	$-V_{g_1}$	max.	100	V
Cathode current	I_k	max.	50	mA
Voltage between cathode and heater	V_{kf}	max.	120	V
Bulb temperature	t_{bulb}	max.	225	^{o}C
Grid No.1 resistor (automatic bias)	R_{g_1}	max.	1	MΩ

Heater voltage: The average heater voltage should be 6.3 V.
Variations of the heater voltage exceeding the range of 6.0 V to 6.6 V will shorten the tube life.
The tolerance of heater current (column II) should be taken into account.

OPERATING CHARACTERISTICS

Output tube class A

Anode voltage	V_a	200	250	V
Grid No.3 voltage	V_{g_3}	0	0	V
Grid No.2 voltage	V_{g_2}	200	250	V
Grid No.2 resistor	R_{g_2}		1	kΩ
Cathode resistor	R_k	130	270	Ω
Anode current	I_a	30	24	mA
Grid No.2 current	I_{g_2}	4.1	3.3	mA
Mutual conductance	S	9	–	mA/V
Internal resistance	R_i	52	–	kΩ
Load resistance	$R_{a\sim}$	7	10	kΩ
Output power	W_o	2.7	2.8	W
Total distortion	d_{tot}	10	10	%

Output tube class AB (two tubes)

Anode voltage	V_a		200		V
Grid No.3 voltage	V_{g_3}		0		V
Grid No.2 voltage	V_{g_2}		200		V
Cathode resistor	R_k		130		Ω
Load resistance	$R_{aa\sim}$		9		kΩ
Input voltage	V_i	0	0.31	5.2	V_{RMS}
Anode current	I_a	2x20.6	–	2x24.6	mA
Grid No.2 current	I_{g_2}	2x2.8	–	2x4.9	mA
Output power	W_o	0	0.05	5.7	W
Total distortion	d_{tot}	–	–	3.0	%

OPERATING CHARACTERISTICS (continued)

Output tube class AB (two tubes)

Anode voltage	V_a		250		V
Grid No.3 voltage	V_{g_3}		0		V
Grid No.2 voltage	V_{g_2}		250		V
Cathode resistor	R_k		150		Ω
Load resistance	$R_{aa\sim}$		9		kΩ
Input voltage	V_i	0	0.32	7.8	V_{RMS}
Anode current	I_a	2x23.5	–	2x29.5	mA
Grid No.2 current	I_{g_2}	2x3.2	–	2x6.6	mA
Output power	W_o	0	0.05	9	W
Total distortion	d_{tot}		–	4.5	%

7Z01249
E80L

$V_{g_2} = 200V$

$V_{g_1} = 0V$

I_a (mA)

$W_a = 8W$

-1V
-2V
-3V
-4V
-5V
-6V
-7V
-8V

0 50 100 150 200 250 V_a (V) 300

7Z04286-5.hj.12

I_{g2} (mA)

$V_{g2} = 200V$
$V_{g3} = 0V$

$V_{g1} =$
0V
-1V
-2V
-3V
-4V
-5V
-6V

0 50 100 150 200 250 V_a (V) 300

7Z01250
E80L
V_{g_2} = 150 V
W_a = 8 W
I_a (mA)
V_{g_1} =
0V
-1V
-2V
-3V
-4V
-5V
-6V
-7V
0
20
40
60
100
200
300
400
500
V_a (V)

7Z03836-5.hj.12
I_{g2} (mA)
V_{g2} = 150V
V_{g3} = 0V
V_{g1} =
0V
−2V
−4V
−6V
0
20
40
60
100
200
300
400
500
V_a (V)

7Z04293-5.hj.12

V_a = 200V
V_{g2} = 200V
V_{g3} = 0V
R_k = 130Ω
$R_{a\sim}$ = 7kΩ

I (mA); d(%); V_i (V_{rms}); W_o (W)
I_a, V_i, d_{tot}, I_{g2}

7Z04290-5.hj.12

V_a = 200V
V_{g2} = 200V
V_{g3} = 0V
R_k = 130Ω

W_o (W); $R_{a\sim}$ (kΩ)
d_{tot} = 10%, 5%, 2.5%, 1%

7Z04292-5.hj.12

V_a = 250V
V_{bg2} = 250V
V_{g3} = 0V
R_k = 270Ω
R_{g2} = 1kΩ
$R_{a\sim}$ = 10kΩ

I (mA), d (%); V_i (V_{rms}); W_o (W)
Curves: I_a, V_i, d_{tot}, I_{g2}

7Z04291-5.hj.12

V_a = 250V
V_{bg2} = 250V
V_{g3} = 0V
R_k = 270Ω
R_{g2} = 1kΩ

W_o (W); $R_{a\sim}$ (kΩ)
Curves: I_{g1} = +0.3 μA; d_{tot} = 10%, 5%, 2.5%, 1%

7Z04287-5.hj.12

2 x E80L (AB)
V_a = 200 V
V_{g2} = 200 V
R_k = 130 Ω
$R_{aa\sim}$ = 9 kΩ

I (mA): 0, 20, 40, 60, 80
V_i (V_{rms}), d(%): 0, 2, 4, 6, 8
W_o (W): 0, 1, 2, 3, 4, 5, 6
Curves: V_i, I_a, d_{tot}, I_{g2}

7Z04288-5.hj.12

2 x E80L (AB)
V_a = 250 V
V_{g2} = 250 V
R_k = 150 Ω
$R_{aa\sim}$ = 9 kΩ

I (mA): 0, 20, 40, 60
V_i (V_{rms}), d(%): 0, 5, 10, 15
W_o (W): 0, 2, 4, 6, 8, 10
Curves: I_a, V_i, d_{tot}, I_{g2}

PHILIPS

Data handbook

PHILIPS

Electronic components and materials

E80L

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